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(54) Abstract Title
Seat

(57) A seat 1 is provided within a motor vehicle. The seat 1 comprises a seat base 2 and a seat back 3 secured to a hinge arrangement comprising pivot members 5, 6, 7. In a stowed configuration, a rear surface of the seat 1 is consistent with a mounting surface 8. In the deployed configuration, a latch end 16 engages a reciprocal lock element 17 so that the seat is robustly retained. The pivot members 5, 6, 7 act about respective pivot mounts 10, 11, 13, 14, 15 to facilitate movement of the seat 1 between the stowed configuration and the deployed configuration whilst also reinforcing the seat 1 in such deployed configuration to prevent deformation under occupant 20 load.

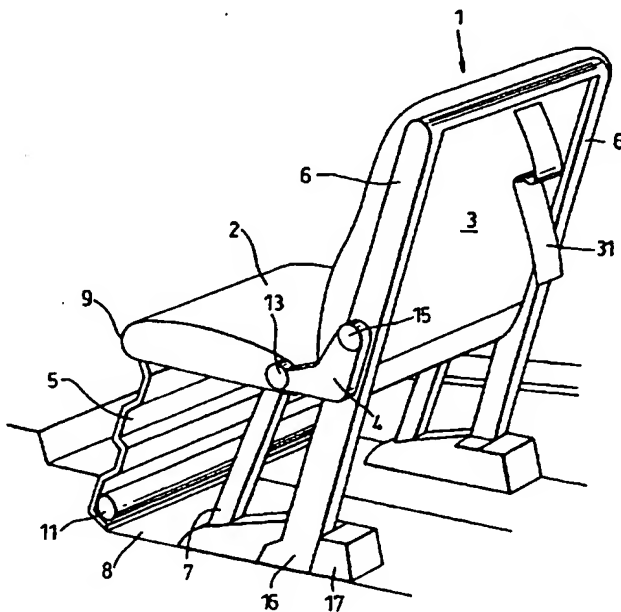


Fig. 4

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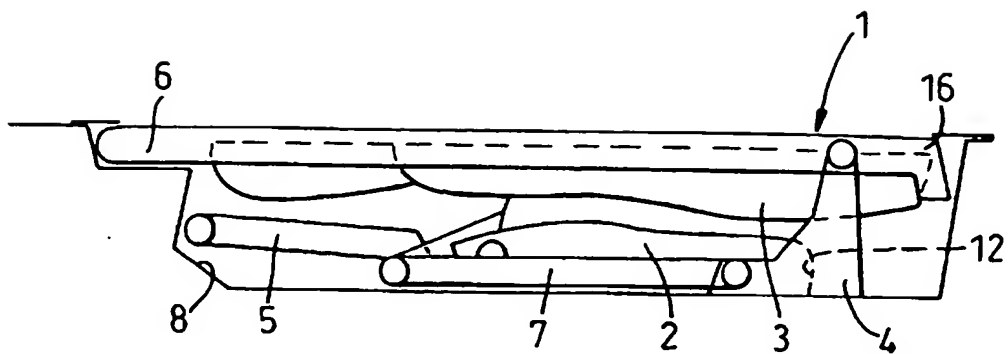


Fig. 2

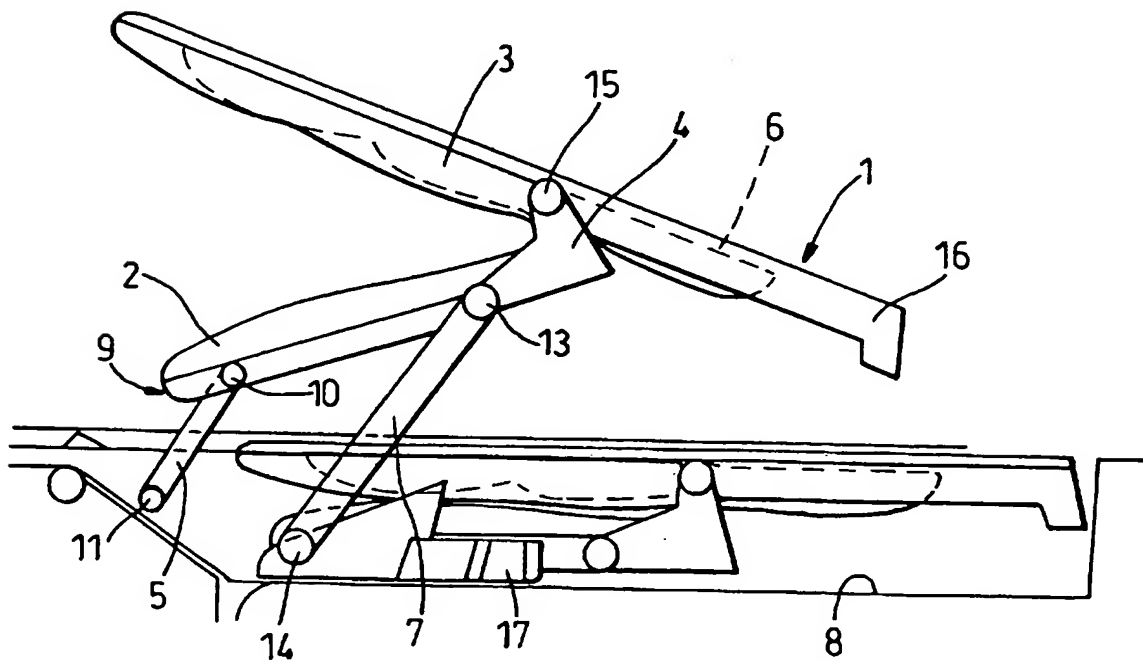


Fig. 3

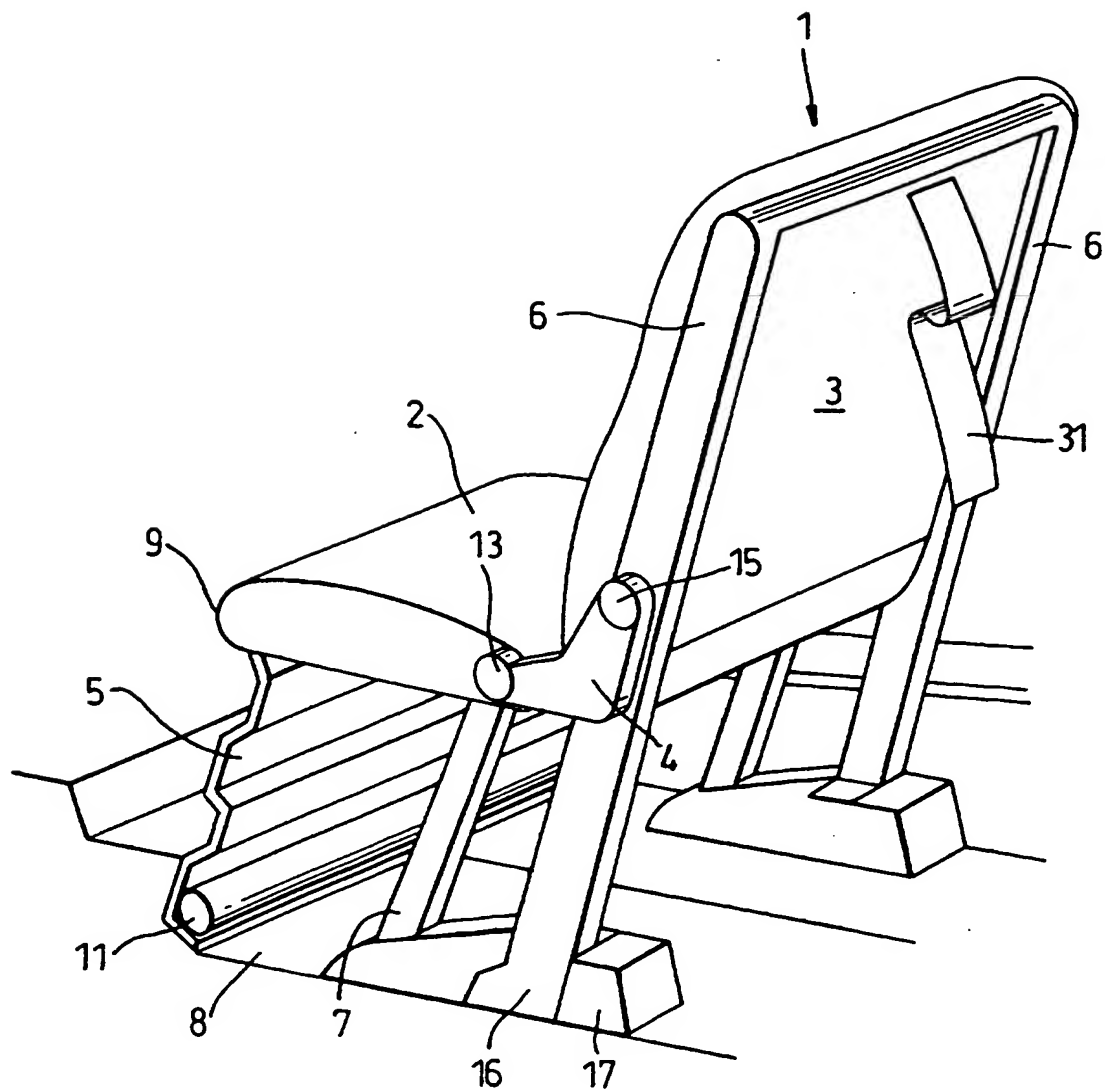


Fig. 4

A Seat

The present invention relates to a seat and more particularly but not exclusively to a seat for use within a motor vehicle.

Clearly, within a motor vehicle it is necessary to provide seating for all occupants which is both convenient for access whilst remaining sturdy during a vehicle collision in order to protect the occupants. With regard to so called utility or off-road vehicles, it is desirable to provide additional so called third row or auxiliary seating which is only occasionally used. This third row or auxiliary seating is normally located within the luggage space of the vehicle and is deployable from either the vehicle floor or side walls. In such circumstances, it is necessary that the third row or auxiliary seating diminishes the luggage carrying capacity of the vehicle to as low an extent as possible.

One approach to ensuring that so called third row or auxiliary seating does not diminish the luggage carrying capacity of a vehicle is clearly to make such seating detachable from the vehicle in order to allow removal when not required. However, the most convenient solution is to provide stowage as described above in the side walls or the floor of the vehicle. With such stowage of so called third row or auxiliary seating, it will be appreciated that quite complex mechanisms will be necessary to ensure an adequately compact stowage configuration for the seating whilst achieving sufficient deployment of a seat to accommodate a normally sized adult. Furthermore, it will be understood that auxiliary seating can significantly add to vehicle weight and so it is desirable to limit that seating weight as far apart as possible.

It is an object of the present invention to provide a seat which achieves the above described desirable auxiliary seating within a vehicle whilst substantially

avoiding the problems of significant vehicle weight increase and impingement upon the luggage carrying space of that vehicle.

In accordance with the present invention there is provided a seat for a vehicle, the seat comprising a seat base and a seat back held in association by a cross-member and coupled to a hinge arrangement comprising a front pivot member, a
5 back pivot member and an intermediate pivot member, the front pivot member being pivotally secured adjacent a front edge of the seat base whilst the seat back is pivotally secured to the cross-member and the intermediate pivot member being pivotally secured to the seat base and the cross-member about a rear edge of the
10 seat base, the front pivot member and the intermediate pivot member also being pivotally secured at relatively spaced pivot positions upon a seat mounting surface whilst a latch end of the back pivot member is arranged to engage a reciprocal lock element associated with that mounting surface whereby the front pivot member and the intermediate pivot member may be rotated about their respective spaced
15 pivot positions between a stowed configuration where the seat base and the seat back are substantially facing each other to a deployed configuration where the latched end engages the reciprocal lock element with the seat base and the seat back presented upon the respective back pivot member, front pivot member and intermediate pivot member in a relationship determined by the cross-member
20 shape and location of pivot with regard to the seat base and seat back.

Typically, the seat mounting surface is a recess within the motor vehicle floor. Furthermore, the rear of the seat back may act in association and co-operation with the edges of such a recess to provide a floor surface which is substantially consistent and flat thereacross.

25 The seat base and seat back will typically be formed from an aluminium pressing or extrusion in order to minimise seat weight. Furthermore, these

aluminium pressings or extrusions for the seat base or seat back may be ribbed or corrugated to improve deformation resistance and strength.

The front pivot member may include two distinct leg segments with respective pivot mountings to the seat mounting surface or may comprise a sheet of material
5 which extends substantially across the seat base width.

The back pivot member may comprise at least two stanchions with the seat back therebetween each stanchion having a pivot mounting to the seat back and the cross-member.

The intermediate pivot member may comprise a plurality of legs or sheets
10 which extend from beneath the seat base to the seat mounting surface.

The seat back may be extendible.

The latch end may comprise a hook with the reciprocal lock element comprising a bar or eye into which that hook engages. The latch end and the reciprocal lock end can take the form of a clasp in order to secure the seat in the
15 deployed configuration.

Typically, the cross-member will extend along a rear edge of the seat base and the bottom edge of the seat back in order to retain association therebetween. The cross-member may comprise separate plates upon opposite sides of the seat back and seat base or, more conveniently, comprise a spar extending between those
20 opposed sides. Furthermore, the cross-member will typically have a substantially L-shaped portion to provide pivot positions upon their respective seat base and seat back in order to achieve a substantially perpendicular relationship therebetween in the deployed configuration.

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings in which:-

Figure 1 is a schematic side cross-section of a seat in a deployed configuration;

Figure 2 is a schematic side cross-section of a seat in a stowed configuration;

5 Figure 4 is a schematic side cross-section of a seat in a part deployed configuration; and

Figure 4 is a pictorial perspective view of a seat in a deployed configuration.

As indicated above, with regard to auxiliary seating within a vehicle, the configurations of the seat which are of particular importance are the stowed
10 configuration and the deployed configuration. Clearly, in the stowed configuration when auxiliary seating is not required then that seating should only have a limited effect upon the luggage carrying capacity of the vehicle. In the deployed configuration however, the seating should be as near conventional as possible in order to ensure passenger comfort and safety within that vehicle. Thus, according
15 to the present invention and as depicted in the Figures, and in particular in Figures 1 and 2, a seat 1 comprises a seat base 2 and a seat back 3 held in association by a cross-member 4 relative to a hinge arrangement comprising a front pivot member 5, a back pivot member 6 and an intermediate pivot member 7. Typically, these pivot members 5, 6, 7 will either comprise legs or stanchions
20 either side of the seat base 2 and seat back 3 in order to support the seat 1 created by the components in the deployed state or may comprise plates which extend across these components 2, 3. In any event, it is by pivot movements of the pivot members 5, 6, 7 relative to the seat base 2 and seat back 3 along with a seat mounting surface 8 which achieves a necessary displacement between the deployed

configuration depicted in Figure 1 and the stowed configuration depicted in Figure 2.

The front pivot member 5 is pivotally secured adjacent a front edge 9 of the seat base 2 with a pivot mounting 10 and is also secured to the seat mounting surface 8 through a pivot mounting 11.

The intermediate pivot member 7 is secured adjacent a rear edge 12 of the seat base 2 with a pivot mount 13. The intermediate pivot member 7 is also secured to the seat mounting surface 8 through a pivot mounting 14. Thus, it will be appreciated that the respective front pivot member 5 and intermediate pivot member 7 can ensure the pivot motion about their respective mountings 10, 11, 13, 14 in the direction of arrow heads A and B between the stowed configuration (Figure 2) and the deployed configuration (Figure 1) is controlled and limited.

The back pivot member 1 is pivotally secured to the cross-member 4 through a pivot mounting 15. Thus, this member 1 and the associated seat back 3 can hinge pivot about the mounting 15 in the direction of arrow head C again between the stowed configuration (Figure 2) and the deployed configuration (Figure 1). The range of rotation about the mounting 15 is limited by a latch end 16 of the back pivot member 6 engaging a reciprocal lock element 17 associated with the seat mounting surface 8. It will be appreciated that the combined effect of the front pivot member 5 and the intermediate pivot member 7 is to precipitate a trapezoidal movement in their respective hinge pivoting motion in the directions of arrow heads A, B such that the latch end 16 is substantially always presented to the locking element 17 upon rotation in the direction of arrow head C.

In order to release seat 1 from a deployed configuration (Figure 1), it will be understood that the lock association between the latch end 16 and the lock

element 17 is released to allow rotation in the direction of arrow head C forwards i.e. towards the front of the seat 1. By such release, all the pivot members 5, 6, 7 can hinge pivot about their respective mountings 10, 11, 13, 14, 15 such that the seat back 3 rotates towards the seat base 2 until in the stowed configuration (Figure 2) where these components 2, 3 substantially face and are parallel with regard to each other. Clearly, for convenient stowage the front pivot member 5 and the intermediate pivot member 7 should be arranged at offset positions upon the base 2 whereby in the stowed configuration (Figure 2) these members do not collide and foul each other.

10 As illustrated in Figures 1 and 2, most conveniently the present seat 1 will be stowed within a recess of a vehicle such that the surfaces of that recess constitute the seat mounting surface 8. In such circumstances, the rear surface of the seat back 3 along with the back pivot member 6 will generally act to bridge between edges of the recess in order to provide a consistent flat surface for a vehicle. In
15 such circumstances, it will be appreciated that the luggage stowage space within the vehicle is not diminished by the present seat 1. However, in order to accommodate the seat 1 within a recess it will be appreciated that careful choice of component dimensions is necessary for stowage within the recess whilst achieving an adequate seat 1 leg height LH for occupants of the vehicle. A particular
20 problem with regard to achieving such acceptability of seat 1 is with respect to provision of adequate seat back length for the occupant 20 and so the seat back 3 will typically include an extendible section 21 which may be raised specifically to provide adequate occupant 20 back support and also where required a head rest for that occupant 20.

25 Clearly, with regard to a vehicle seat it is necessary to provide that such a seat in its deployed configuration is sufficiently robust both for normal use and also to provide protection to the occupant 20 during a vehicle collision. In the

deployed configuration depicted in Figure 1 as indicated previously, the lock association between the latch end 16 and the lock element 17 provides retention of the deployed configuration. However, it will also be appreciated that by a slight rearward inclination of the seat 1 that the occupant 20 will typically present a significant proportion of their weight against the back pivot member 6 and seat back 3 such that there is a lever action about the pivot mount 15 against the latch end 16/lock element 17 to further facilitate deployed configuration retention in use. Forward movement of the seat 1 will be resisted by the lock association between the latch end 16 and lock element 17 along with location of the pivot mount 11 against a ledge of the surface 8 such that further forward rotation of the front pivot member 5 in the direction of arrowhead A beyond that shown in the deployed configuration of Figure 1 is resisted. In the above described circumstances, it will be appreciated that in the deployed configuration the seat 1 with an occupant 20 located therein provides a robust and sturdy arrangement.

It is also desirable with regard to auxiliary seating within a motor vehicle to ensure that there is not a significant increase in vehicle weight as a result of providing such seating. Thus typically, in accordance with the present invention structural components of the seat 1 i.e. seat base 2, seat back 3 and pivot members 5, 6, 7 will be made from relatively light aluminium pressings or extrusions. In such circumstances, it will be appreciated that there is a possibility of so called 'lozengeing' between the seat base 2 and seat back 3 when an occupant 20 is sitting in the seat 1. This lozengeing is a result of deformation of the seat base 2 relative to the seat back 3 and is equivalent to a partial collapse of the seat 1. In order to resist this 'lozengeing' effect the present invention includes a cross-member 4 which acts both to determine the presentational relationship between the seat base 2 and the seat back 3 in the deployed configuration and also to reinforce that relationship. Typically, the cross-member 4 may have end members as shown in the

Figures which are associated with the respective pivot mountings 13, 15 of the intermediate pivot member 7 and back pivot member 6. This association of the cross-member components may be through interference or friction fit or other means. These end members or plates may form the cross-member 4 with a spar or beam between respective plates or members upon opposite sides of the seat 1.

In the above described circumstances, it will be appreciated that the end plates which form the cross-member 4 by the spaced pivot positions for the mountings 13, 15 act to determine the following:-

- a. the angular relationship of the seat base 2 and seat back 3 in the deployed configuration depicted in Figure 1;
- b. provide the necessary eccentric offset between the seat back 3 and the seat base 2 in the stowed configuration depicted in Figure 2 such that compact face-to-face and parallel stowage can be achieved;
- c. provide a reinforcement of the relationship between the seat base 2 and the seat back 3 in the deployed configuration to resist deformation and lozenging as a result of occupant weight.
- d. in the stowed configuration depicted in Figure 2 provide some reinforcing support to the rear surface of the seat back 3 to limit submarining of the seat 1 into a recess under the weight of luggage loads placed thereupon.

Specific choice of spaced pivot positions is thereby determined for particular installations in order to achieve desirable deployment/stowage. Furthermore, these spaced positions may be fixed at installation or be adjustable to suit expected seat occupants and other requirements.

In order to facilitate initial uplift of the seat 1 from the surface 8 in a recess, a strap 31 is normally provided upon the rear of the seat back 3. However, it will be understood that a handle or key/finger grip could alternatively be provided to facilitate such uplift.

5 As indicated above, normally the seat base 2 and seat back 3 would comprise a pressed sheet of material with a foam cushion located for occupant 20 comfort thereupon. However, such cushioning can require inconvenient component dimensions and recess depth for accommodation within a vehicle in comparison with the only occasional use of such auxiliary seating. Thus, typically the depth of
10 such cushioning will be less than that for conventional seating within a vehicle but nevertheless by judicious choice of foam density an adequate seat for an occupant can be formed.

As indicated above, the pivot members 5, 6, 7 can take the form of a panel extending across the width of the seat 1 as depicted with regard to the front pivot
15 member 5 in Figure 4. However, as indicated before, it is important to ensure that there is no collision fouling between these pivot members 5, 6, 7 upon pivot motion for stowage or deployment. Thus, a combination of two stanchion or leg elements to form the respective pivot members 5, 6, 7 may be utilised. It will be understood that by using a panel as depicted for the front pivot member 5 that the front edge 9
20 of the seat 1 is supported along its whole length such that the possibility of bowing in the middle of the seat base 2 is reduced. A similar resistance to bowing could be provided with regard to provision of the intermediate pivot member 7 and back pivot member 7 as panels rather than stanchions or legs provided any problems of collision fouling are avoided in displacement between the stowed configuration and
25 the deployed configuration. In any event, it will be appreciated that panels generally provide a broader mounting width than legs so more support is provided. Furthermore, where relatively weak panel materials are used to form the

structural components of the seat base 2 and seat back 3, it will be appreciated that such reinforcement provided by panels for the pivot members 5, 6, 7 will augment and strengthen the components 2, 3 in order to provide a more robust seat 1 deployment.

5 It will be appreciated as described above, the principal determinants with regard to the depth of recess in which a seat 1 can be stowed are the component dimensions, in particular thickness of the seat base 2 and seat back 3. However, in accordance with the present invention, it is possible to stow a seat 1 with adequate deployed leg height LH within a recess depth in the order of 170mm. It
10 will also be understood that with only a limited number of components and a simple pivot hinge rotation of pivot members 5, 6, 7 between stowage (Figure 2) and deployed configuration (Figure 1) that the present seat 1 is less difficult to assemble within a vehicle and so cheaper to manufacture.

 The present seat can provide an individual seat for an occupant within a
15 vehicle or may more fully extend across the width of a vehicle in order to provide a bench seat. However, due to the longer dimensions with regard to a bench seat, it will be appreciated that adequate support must be provided by the pivot members in order that any lozengeing and deformation to the seat as a result of occupant load weight is not detrimental to performance by bending the seat in use.

20 It will be appreciated that the structural panels located within the seat base 2 and/or the seat back 3 may be extruded panels which include appropriate articulation points or orifices to provide the pivot mountings 10, 13, 15. An extruded section can therefore be provided of the desired length for a particular vehicle. Thus, with the reinforcing effects of the pivot members 5, 6, 7 an
25 acceptably robust performance for the seat can be achieved at limited cost.

CLAIMS

1. A seat for a vehicle, the seat comprising a seat base and a seat back held in association by a cross-member and coupled to a hinge arrangement comprising a front pivot member, a back pivot member and intermediate pivot member, the front pivot member being pivotably secured adjacent a front edge of the seat base whilst the seat back is pivotably secured to the cross-member, the intermediate pivot member being pivotably secured to the seat base and the cross-member about a rear edge of the seat base, the front pivot member and intermediate pivot member also being pivotally secured at relatively spaced pivot positions upon a seat mounting surface whilst the latch end of the back pivot member is arranged to engage a reciprocal lock element associated with that mounting surface whereby the front pivot member and intermediate pivot member may rotate about their respective spaced pivot positions between a stowed configuration where the seat base and the seat back are substantially facing each other to a deployed configuration where the latched end engages the reciprocal lock element with the seat base and the seat back presented upon the respective back pivot member, front pivot member and intermediate pivot member in a relationship determined by the cross-member shape and location of pivot with regard to the seat base and seat back.
2. A seat as claimed in Claim 1 wherein the mounting surface comprises a recess within a vehicle.
3. A seat as claimed in Claim 2 wherein the seat in the stowed configuration has a rear surface of the seat back co-operative with the edges of the recess to provide a consistent floor surface thereacross.

4. A seat as claimed in any preceding claim wherein the seat base and/or seat back include a structural member made from an aluminium extrusion or pressing.
5. A seat as claimed in Claim 4 wherein the aluminium pressing includes ribs or corrugations to facilitate the resistance to deformation under load.
6. A seat as claimed in any preceding claim wherein the front pivot member comprises a plurality of leg elements or a single plate which extends across the width of the seat.
7. A seat as claimed in any preceding claim wherein the back pivot member comprises at least two stanchion members or a plate which extends across the width of the seat and to which the seat back is secured.
8. A seat as claimed in any preceding claim wherein the intermediate pivot member comprises a plurality of legs or a plate which extends across the width of the seat.
9. A seat as claimed in any preceding claim wherein the seat back is extendible in order to increase its length for greater occupant comfort.
10. A seat as claimed in any preceding claim wherein the latch end comprises a hook and the reciprocal lock element comprises a bar or eye to engage that hook in the deployed configuration.
11. A seat substantially as herein before described with reference to the accompanying drawings.



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Claims searched: 1-11

Examiner: Jeremy Philpott
Date of search: 12 August 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK CI (Ed.Q): A4L [LAAR, LBPB, LBDP, LBPE, LBPF, LBPH]

Int CI (Ed.6): B60N: 2/10, 2/30, 2/32

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	US 5195795 (Raymond C. Cannera & Douglas J. Stafford) whole document & Figures.	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.